ISSN 2475-529X

Research Article

Journal of Nursing & Healthcare

Knowledge and Risk Factors of Hepatitis B Disease Among Women Attending Antenatal Care at Arua Regional Referral Hospital, Arua, Uganda

Benjamin Atwine[1*], Mbaruk A. Suleiman[2], Alfred Owino Odongo[3], Emmanuel Manenga[4]

[1]*Mount Kenya University, Thika, Kenya.*

[2]*Department of Medical Laboratory Sciences, Mount Kenya University, Thika, Kenya*

[3]*School of Public Health, Mount Kenya University, Thika, Kenya*

[4]*Arua Regional Referral Hospital- Regional Blood Bank, Uganda.*

[*]Corresponding author
Benjamin Atwine, Mount Kenya University, Thika, Kenya.

Submitted: 09 Nov 2022; **Accepted**: 16 Nov 2022; **Published**: 08 Dec 2022

Citation: *Benjamin Atwine, Mbaruk A. Suleiman, Alfred Owino Odongo, Emmanuel Manenga, (2022). Knowledge and Risk Factors of Hepatitis B Disease Among Women Attending Antenatal Care at Arua Regional Referral Hospital, Arua, Uganda, J Nur Healthcare, 2022, 7(4), 68-77.*

Abstract

Background

Hepatitis B is a highly infectious disease with a prevalence of 4.3% among people aged 15-64 years, with a prevalence of 5.6% in men compared to 3.1% in women in Uganda. Mother-to-child transmission accounts for nearly 50% of new cases per year, and infants who acquire hepatitis B disease before 5 years have a 90% chance of progressing to chronic hepatitis B infection.

Objective

The study assessed the knowledge and risk factors of hepatitis B disease among women attending antenatal care (ANC) at Arua Regional Referral Hospital (ARRH), Uganda.

Methods

A cross-sectional study was carried out at ANC at ARRH. Convenience sampling was used, and a sample size of 384 was calculated. Each participant was evaluated using a structured questionnaire and screened for HBsAg using commercial rapid test kits. Assessment of knowledge was performed using a hepatitis B basic knowledge summary score. Data analysis was carried out using MICROSOFT EXCEL-2013 and STATA version 14 packages.

Results

Poor knowledge levels of hepatitis B disease stood at 17.9%, while 82.1% of the pregnant women had adequate knowledge. A prevalence of 2.05% was obtained from the participants in the study. None of the assessed risk factors was significantly associated with HBsAg positivity.

Conclusions

The study participants were knowledgeable to a great extent about hepatitis B disease, with 82.1% exhibiting good knowledge of hepatitis B disease. There are gaps in knowledge, especially among the low educated groups, which need to be addressed to improve knowledge levels of hepatitis B disease among these categories in the community. The results show a relatively healthy population given the low prevalence of 2.05% seen in the participants of the study. The absence of a risk factor associated with hepatitis B disease in this study does not imply that there are no risk factors in the community around ARRH. Further studies are recommended to assess more risk factors for hepatitis B disease in the community

Keywords: Knowledge, Risk factors, Hepatitis B, Antenatal

Introduction

Hepatitis refers to a condition where the liver is inflamed. It can be caused by both infectious and noninfectious agents, especially hepatitis virus, autoimmune disease or toxic substances, including alcohol, among other diseases. Hepatitis A and Hepatitis E infections spread after consumption of intoxicated water and food substances, whereas contact of contaminated body fluids is the major route of spread of Hepatitis B, Hepatitis C and Hepatitis D. Liver cirrhosis and liver cancer associated with Hepatitis disease are commonly caused by Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) [1-3].

Infection with HBV affects people worldwide and has greatly contributed to the development of cancerous cells among people across the globe [1]. Globally, over 200 million people are infected and living with HBV-type infections, which has resulted in over 887,000 deaths globally according to information from the WHO survey carried out in 2015 [1]. Globally, the most affected region comes from the Western Pacific in the leading position and the African continent, with approximately 6.2% and 6.1%, respectively, of the supplied infected persons, of which the adult age takes the center stage [1]. In Africa, there are approximately 50 million people living with hepatitis B [4]. In the East African region, pooling the prevalence of HBV by country, Kenya had the highest prevalence rate of 8.54%, followed by Uganda (8.454%) and Tanzania (5.16%), and finally Rwanda had the lowest prevalence (4.1%) [5].

Looking at Uganda, the prevalence of hepatitis among people aged 15-64 years is 4.3%, with a slightly higher prevalence of 5.6% in men compared to 3.1% in women from the recent Uganda Population-Based HIV Impact assessment. Regional variation in the prevalence of the disease, with the North contributing the highest prevalence, with 4.6% in the mid North, 4.4% in the Northeast and 3.8% in the West Nile regions, should be utilized to focus the national response [6, 7]. The disease has a higher mortality rate among women aged 15-19 years than among men of the same age group [8].

Getting in contact with contaminated body fluids, such as vaginal secretions, blood, saliva, and semen, that have high concentrations of the virus increases the chances of an uninfected person acquiring a hepatitis B infection [9]. Practices such as unsafe abortions, traditional tattooing and piercings, a high number of sexual partners, inconsistent condom use, infections with sexually transmitted infections and blood transfusion of unscreened blood are some of the risk factors for hepatitis B disease.

Most people with hepatitis B present to health facilities with advanced disease because testing among vulnerable populations, including women, remains poor within resource-limited settings, hence increasing the risk of infecting the child during or immediately after birth. This knowledge gap can enhance the spread of disease and advancement of disease [1, 10 -12].

HBV causes acute hepatitis with noticeable symptoms of jaundice of the eyes and skin, production of dark yellow urine coupled with severe vomiting-like symptoms and intense abdominal pains. Acute liver failure results from this and causes death [13].

HBV is the leading cause of chronic liver infections that have resulted in the development of cirrhosis referred to as hepatocellular carcinoma [14]. Chronicity is highly dependent on the age of a person who acquires the virus. Infants have a high likelihood of being chronic (90%) when infected before the 1st year of life, while those infected between 1-6 years and children above 6 years have a 30%-50% and 5%-10% chance, respectively, of developing chronic hepatitis B. Adults have the lowest chances of developing chronic hepatitis of approximately less than 5% [15].

The chances of progression to chronic liver disease are increased if HBV is acquired early in life. Infants who acquire disease during pregnancy or after birth (mother-to-child transmission) from mothers suffering from or exposed to hepatitis B disease have a 90% chance of progressing to chronic hepatitis B infection compared to 30-50% and <5% chronicity when acquired by horizontal transmission before 6 years of age and when infected in adulthood, respectively [1, 16-18].

Every day in 2015, 16,000 children under five continue to die, mostly from preventable causes, including hepatitis B disease [19]. This transmission is preventable if women are aware of risk factors associated with and the measures required for prevention of hepatitis B disease. However, recent studies reported that women in developing countries, including Cameroon and China, have limited knowledge of hepatitis B disease [20, 21].

Although worldwide HBV vaccination numbers in children have greatly improved, including Uganda, when it was introduced in 2002 as part of the child national immunization schedule, most of the new HBV infections are still by mother-to-child transmission (MTCT). In high epidemic countries and low epidemic countries, it contributes to approximately 50% and one-third of new infections, respectively [13, 15].

Although the vaccine is available both in private and public hospitals and health center's in Uganda, several people do not complete the whole course of the vaccination schedule for hepatitis B disease or get vaccinated at all.

The risk factors associated with hepatitis B disease have not been identified among women in Uganda among various populations, making it difficult to have targeted interventions to reduce the spread of the disease.

Materials and Methods

An analytical cross-sectional study design was used to assess the knowledge of hepatitis B and its associated risk factors among women attending ANC at Arua Regional Referral Hospital (ARRH) Antenatal Clinic (ANC) located in the northwestern part of Uganda. The prevalence of hepatitis B disease in the sample population was also determined using the findings of the HBsAg test.

Sampling Strategy and Sample Size

The sampling method of convenience sampling [22] was used,

where all women attending ANC at ARRH were eligible until the sample size was obtained. Participants were selected from pregnant women who attended ANC at any time. Only those who consent to be part of the study were included as part of the sample. The total sample size for the study was 384. However, only 89% (341) of participants took part in the study due to the available time and resources.

Construction of Research Instruments

The structured questionnaire was designed with sections that cover demographic data, social status, facts on hepatitis B to assess knowledge and a section to assess participant's risk factors for hepatitis B. The questionnaire included both open- and closed-ended questions. The questionnaire was adapted from a WHO protocol for designing Hepatitis B assessment tools [23].

The questionnaire was administered to each woman who attended antenatal care on a one-on-one basis. The participant was required to have written consent before the interview on the questionnaire was started. For participants who could read and write in English, a research assistant was available to interpret the entire questionnaire to them in local languages and have consent through a thumb print.

Blood tested for hepatitis B had results tagged to the respective questionnaire by using the same code indicated on both the questionnaire and sample. This is to ensure the confidentiality of the results since only unique numbers were used for every client.

Prior to the study at ARRH, the questionnaire was pretested with 40 randomly selected pregnant women at the ANC of Oli HC4, a facility located 3 km from ARRH. Following the pretest, poorly structured questions were edited, and the time it would take to complete the questionnaire was estimated. The revised questionnaire was administered to each pregnant woman who attended antenatal care at ARRH by trained research assistants.

Hepatitis B Testing and Screening.

The participants would then undergo routine counseling before being tested for hepatitis B disease. A brand of accurate HBsAg strips was used for the study purchased from Joint Medical Stores of Batch number 2019060064 and expiration date of 05/2022 According to the manufacturer specifications, these test strips have a clinical sensitivity of 98.6%, clinical specificity of 100% and accuracy of 99.6%, according to the manufacturer's specifications.

A qualified laboratory assistant stationed at the ANC clinic would then draw 3 ml of fresh venous blood from the median cubital vein using a vacutainer needle and EDTA vacutainer tube. Testing involved the use of a capillary tube to pick two drops of whole blood sample, which were deposited on a corresponding sample section of the HBsAg strips, and buffer was added. The test was held for up to 5 to 10 minutes as defined by the test strip instructions before reading the test result. If one band appeared in the test strip's control region, the test was ruled negative. When two bands were observed, it was determined that the test was positive, with one in the test area and the other in the control area. When no band emerged at all or when one band appeared in the test region but not in the control region, the test was declared invalid. This test was rejected, and the remaining blood sample in the test tube was utilized to perform a repeat test with a new strip. This sample was still examined in the same way, and the findings were recorded. The results were utilized to determine the presence of HBsAg in blood and, as a result, the prevalence of hepatitis B disease.

For participants who were negative for the HBsAg test, posttest counselling was carried out to ensure that they stayed negative. Participants who had a positive result for HBsAg were enrolled in routine hepatitis B care in the hospital, which required them to be retested, counseled, and recruited into care as advised by the clinical team of the hospital.

Quality Control and Assurance

For quality assurance and control purposes, each new pack of HBsAg rapid test strips had to undergo a quality control test before use. A known positive and negative sample from the Hepatitis B clinic previously confirmed by ELISA (enzyme-linked immunoassay) was run on 2 test strips to verify if the test strips read the same results as the known sample. If they read the same results as the results of the known sample, then the procedure to test the participants would continue. If any of the 2 samples read a different result, then a 3rd test was to be carried out to verify the results, and if it passed the QA test, then the pack was usable. If it does not, then the pack was to be discarded, and another pack used.

Data Analysis Techniques and Procedures

The packages MICROSOFT EXCEL-2013, EPI-INFO Version 7.2.2, and STATA version 14 were used to analyze the data.

Participants' correct replies were used to determine their specific knowledge about hepatitis B disease. Correctly answered questions received a 1 rating, while "I Don't Know" and improperly answered questions received a 0 rating. Participants with summary scores of 0-2 were regarded to have insufficient information, those with summary scores of 3-5 were considered to have intermediate knowledge, and only those with summary scores of 6-12 were considered knowledgeable. Participants with insufficient or intermediate understanding of Hepatitis B were classified as having poor knowledge of the condition.

The ratio of HBsAg-positive tested samples to the total samples tested was the approximate prevalence of hepatitis B among the study population.

Using logistic regression, the potential risk factors for hepatitis B were determined by the risk ratio for each assessed potential risk factor while using multivalent logistic regression for any risk factors that had a significant association with hepatitis B disease. Risk factors were considered statistically significant for hepatitis B disease when $P < 0.05$.

Ethical Consideration

The researcher followed the ethical standards of conduct established by Uganda's relevant review bodies. Only after receiving a

Certificate of Ethical Clearance from Mount Kenya University's Institutional Ethical Review Committee (IREC) was the researcher permitted to proceed and seek the necessary approvals from the relevant bodies in Uganda to conduct the study. The study was then authorized by the TASO IRB, one of Uganda's recognized Institutional Review Boards, which reviews the research protocol for any research that involves human beings as part of the study. The work was later registered by the Uganda National Council of Science and Technology (UNCST) as a requirement by law for research to be conducted in Uganda. Furthermore, the study was reviewed by the ARRH research and ethics committee as a reassurance that the research protocol was well understood by the administration prior to data collection, and the committee gave the project the go light to proceed.

Confidentiality was always observed, and random codes were assigned to the respondents to ensure that their identity was not revealed. For respondents who came with their spouses for ANC visits, the spouses were not involved in filling out the questionnaires, as only the pregnant woman did so.

Prior to filling out the questionnaire, written informed consent was obtained. Only participants who signed informed consent questionnaires were allowed to take part in the study. Participation in the study was entirely voluntary, and participants had the option to withdraw at any time during the study.

The study was completely free to take part. To be a part of the study or any tests administered as part of the study, none of the participants paid or were paid any money.

Results

Pretest Results

Pretesting of the questionnaire was conducted at Oli Health Center IV located 3 kilometers from Arua district. A total of 40 participants consented to participate in the pretest study. From the 40 questionnaires administered during the pre-test exercise to help revise poorly structured questionnaires, the CVI was calculated for each section of the questionnaire. The CVIs for the sections of sociodemographic characteristics, knowledge, and risk factors for hepatitis B disease were 0.970, 0.950, and 0.956, respectively. This showed excellent reliability of the research instruments in all sections of the questionnaire.

Sociodemographic Characteristics of The Study Participants.

The most common age group was 16-24 years old, which represented 49.3 percent of the participants, followed by 25-34 years old, which represented 43.6 percent of the study's participants. Participants with an education background of primary school were 54.5%, while those who were unemployed contributed to 76% of the participants of the study. Regarding the marital status of the participants, 69.8% were in a monogamous relationship, while 26.4% were in a polygamous relationship. The majority of the participants were multigravidas (46.3%), and those in the second trimester (14-27 weeks) comprised the majority (58.7%) of the participants of the study, as shown in table 1.

Table 1: ***Participants' social and demographic characteristics in the knowledge and risk factors study among women attending ANC at ARRH.***

Characteristic	Frequency, n	Percentage
Age		
<15 years	2	0.6%
16-24 years	168	49.3%
25-34 years	148	43.4%
35-44 years	23	6.7%
> 45 years	0	0.0%
Education Status		
Not attended school	14	4.1%
Primary School	186	54.6%
Secondary School	102	29.9%
University/Tertiary Institution	39	11.4%
Employment Status		
Unemployed	259	76.0%
Employed	71	20.8%
Student	11	3.2%
Marital Status		
Unmarried	13	3.8%

Monogamy	238	69.8%
Polygamy	90	26.4%
Gestational Stage		
1-13 weeks	33	9.7%
14-27 weeks	200	58.6%
>28 weeks	108	31.7%
Parity Status		
Primipara (1st Child)	137	40.2%
Multipara (2-4 Children)	158	46.3%
Grand multipara (>4 Children)	46	13.5%

Knowledge of Hepatitis B Disease

Participants were considered knowledgeable if they scored ≥ 6 summary scores for the 12 questions in the knowledge section. Out of the 341 participants in the study, only 16 (4.7%) had inadequate knowledge of hepatitis B disease, having ≤ 2 summary scores in the section of knowledge, while 45 (13.2%) had intermediate knowledge, having 3-5 summary scores in the section of knowledge in the questionnaire. Two hundred eighty (280) participants accounting for 82.1% had a summary score ≥ 6 in the section of knowledge. A total of 61 (17.9%) of the 341 participants were considered to have poor knowledge by adding up those with inadequate and intermediate knowledge scores regarding hepatitis B disease, given that they scored less than 6 in the Hepatitis B section, which is considered the cutoff for being knowledgeable, as shown in figure 1.

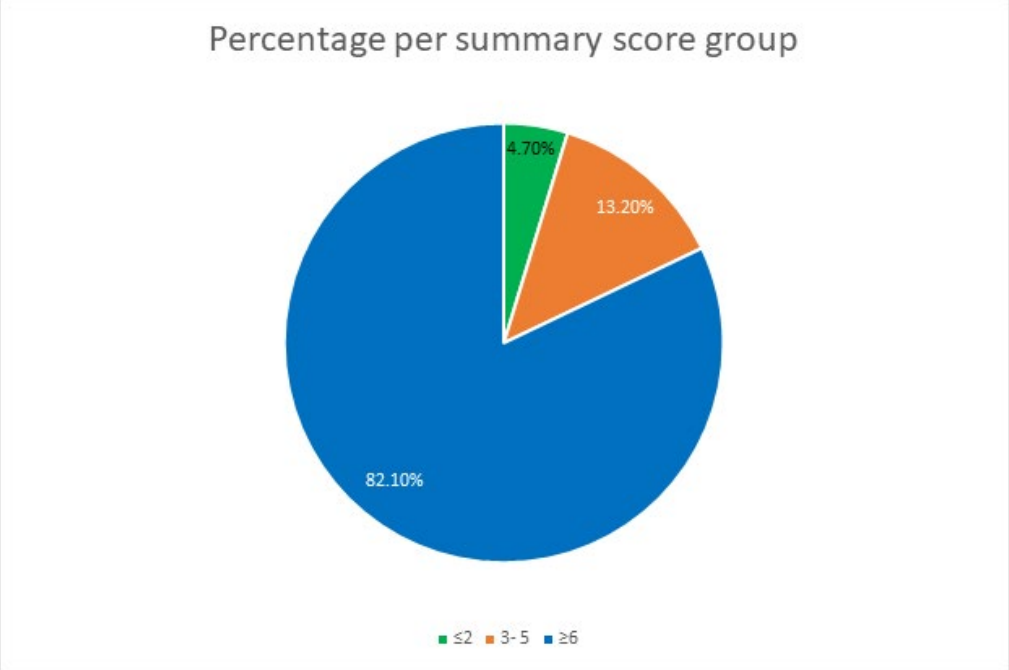

Figure 1: *The percentage per summary score group of a study of knowledge of Hepatitis B disease among women attending ANC at ARRH.*

Note. ≤2 Score =16 participants, 3-5 Score =45 participants, ≥6 Score =280 participants. N= 341

Prevalence of HBsAg

The prevalence of HBsAg positivity in pregnant women was found to be 2.05%. (95% CI: 0.5-3.5). This is below the national prevalence of 4.3%, hence representing a relatively healthy population [7], as shown in Figure 2.

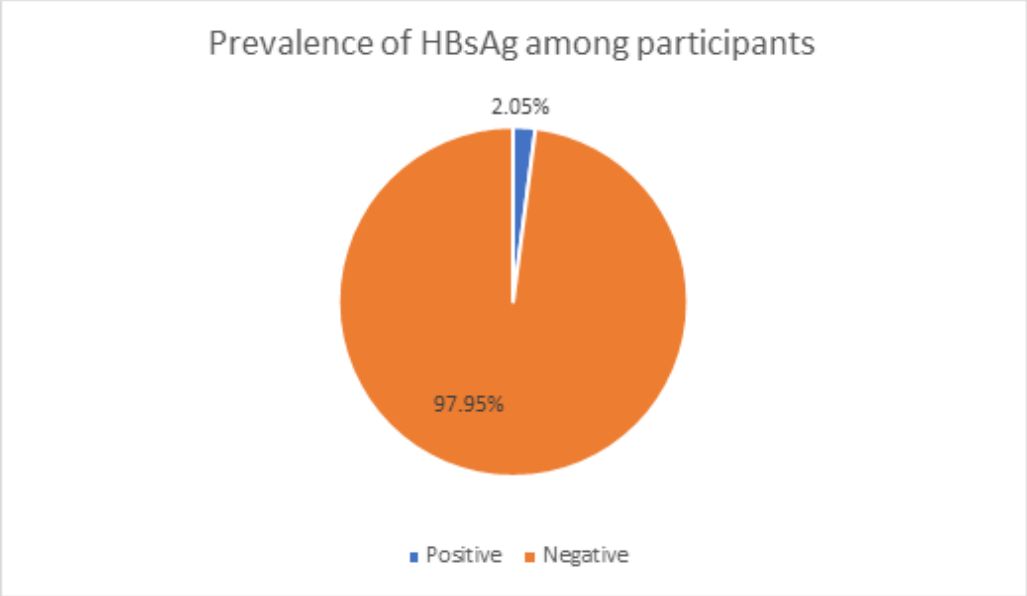

Figure 2: *The prevalence of HBsAg among pregnant women attending ANC at ARRH.*

Note: Tested positive = 7 participants, tested negative = 334 participants, N = 341 participants

Risk Factors Associated With HBsAg.

According to the study's findings, there was no statistically significant relationship between hepatitis B disease and the assessed socio-demographic characteristics of age, education status, employment status, marital status, gestational stage, and parity, as shown in table 2.

Table 2: Association of socio-demographic characteristics with HBsAg positivity among women attending ANC at ARRH

Social Demographic characteristics	Odd Ratio	P value	95% CI
Age			
<15 years	1.000	Reference	Reference
16-24 years	0.537	0.585	0.057-5.020
25-34 years	0.301	0.336	0.026-3.464
35-44 years	1.000		
> 45 years	1.000		
Education status			
Not attended school	1.000	Reference	Reference
Primary	1.267	0.829	0.148-10.828
Secondary	1.000		
University/Tertiary Institution	1.000		
Employment status			
Unemployed	1.000	Reference	Reference
Employed	0.602	0.641	0.071-5.087
Student	1.000		
Marital Status			
Unmarried	1.000	Reference	Reference
Monogamy	0.496	0.365	0.109-2.260
Polygamy	1.000		

Gestational Stage			
1-13 weeks (1st Trimester)	1.000	Reference	Reference
14-27 weeks (2nd Trimester)	0.714	0.633	0.157-3.251
>28 weeks (3rd Trimester)	1.000		
Parity			
Primipara (1st Child)	1.000	Reference	Reference
Multipara (2-4 Children)	0.573	0.545	0.094-3.478
Grand multipara (>4 Children)	2.030	0.446	0.329-12.547

Table 3 shows that there was no statistically significant relationship between hepatitis B disease and the risk factors assessed in women attending ANC at ARRH. Risk factors with a P<0.005 were considered to have a significant association with hepatitis B disease.

Table 3: Association of assessed risk factors with HBsAg positivity among women attending ANC at ARRH

Risk Factor	Number (%)	Number Positive, n	Risk Ratio (95% CI)	P-Value
Past Surgery			0.967 (0.112-8.031)	0.960
Yes	51 (14.96)	1		
No	290 (85.04)	6		
Blood Transfusion			1.00	1.000
Yes	38 (11.14)	0		
No	303 (88.86)	7		
Abortions			1.00	1.000
Yes	94 (27.57)	0		
No	247 (72.43)	7		
Body Piercings			1.032 (0.122-8.756)	0.977
Yes	291 (85.34)	6		
No	50 (14.66)	1		
Tattoos			0.713 (0.136-3.732)	0.689
Yes	122 (35.78)	2		
No	219 (64.22)	5		
Past STIs			0.473 (0.091-2.474)	0.375
Yes	155 (45.45)	2		
No	186 (54.55)	5		
Sexual Partners			0.48 (0.196-14.498)	0.633
≥5	31 (9.09)	1		
<5	310 (90.91)	6		
Condom Use			1.00	1.000
Inconsistently	322 (94.43)	7		
Consistently	19 (5.57)	0		

Discussions

Given the increased likelihood of an infected child who has acquired the virus via vertical transmission to progress to chronic stages of the disease, understanding the potential risk factors associated with hepatitis B disease in each population is critical. This will enable more targeted interventions by the MOH and hospital management in health promotion and education.

The participant characteristics results are consistent with the results disseminated in the annual statistical abstract by the Uganda Bureau of Statistics (UBOS), which show that there are 8.8 million students in primary school compared to secondary and tertiary enrollment, which lies at 1,371,000 and 259,000, respectively [24]. This shows more enrollment in primary than secondary and tertiary enrollment. The results are also consistent with studies that indicate that pregnant women obtain antenatal care late in pregnancy, as shown in a study in Nigeria where 47% sought antenatal care in the third trimester [25]. Most pregnant mothers sought ANC vis-

its late in their pregnancy due to low health-seeking behaviors, as seen in the study, where only 9.7 percent of all participants were in their first trimester. Most participants (58.7 percent) were in the second trimester, with the third trimester accounting for 31.8 percent.

From the study, 17.9% had low levels of poor knowledge of Hepatitis B disease given that they scored greater or equal to 6 of 12 questions in the questionnaire in the section of knowledge of Hepatitis B. This knowledge level amongst women attending ANC at ARRH can be attributed to the previously conducted mass vaccination of Hepatitis B disease in high-risk areas in Uganda that was rolled out in 2015, which saw 23 million adults and adolescents screened for Hepatitis B disease and 17.6 million Ugandans vaccinated against Hepatitis B. During this exercise, health education/promotion was carried out, making the population aware of the disease [7]. A study in Beau Cameroon showed that only 16% of pregnant women were knowledgeable about Hepatitis B disease, which is the reverse of the findings at ARRH [20]. The majority of participants who exhibited poor knowledge of hepatitis B disease were those who had low levels of education.

The prevalence of HBsAg of 2.05% was below the national prevalence of 4.3% [7]. Of the positive cases, 86% were both unemployed and had an education background of primary school. There is a need to have health promotion materials in local languages and local media to ensure awareness of the less educated population. However, this prevalence in the study is not conclusive prevalence of the region as the sample size used in the study was from a confined health facility in one district which does not give the general picture of the entire population in the region. More research with larger sample sizes is needed to determine the prevalence of hepatitis B disease among pregnant women in the region. Furthermore, screening all women seeking ANC services for HBsAg is encouraged, as it was noticed that at ARRH, screening was not performed due to a shortage of test kits prior to the study. This poses a large risk since most infected persons will remain asymptomatic. Screening all women attending ANC will be a very efficient tool in early disease detection, leading to prompt diagnosis, treatment, and other interventions to promote healthier living.

The results of the study showed no significant association of any of the risk factors assessed with hepatitis B disease. The results were consistent with the study carried out in Buea, Cameroon, which also did not identify any risk factors associated with hepatitis B disease [20]. However, other studies around the world have identified at least one risk factor associated with hepatitis B disease. These include early sexual activity engagement, a history of STIs, and a history of multiple sexual partners, as identified in a Nigerian study [26]. In a Mexican study, blood transfusion was found to be the only risk factor associated with hepatitis B positivity [27].

The failure to identify a potential risk factor associated with hepatitis B disease could be because not all risk factors associated with hepatitis B positivity were evaluated, and none of the evaluated risk factors were associated with hepatitis B disease in this population. Furthermore, using a small sample size determined for the use of prevalence rather than identifying risk factors could be one of the reasons why the study could not significantly identify a potential risk factor associated with hepatitis B positivity.

Among women attending ANC at ARRH, none of the assessed participants' social demographic characteristics were associated with HBsAg positivity. The results of a similar study in Buea, Cameroon, found no significant association of the participant's sociodemographic characteristics with hepatitis B disease [20].

Several limitations must be considered when interpreting these findings. The number of participants who agreed to participate in the study (341) was less than the calculated sample size of the study (384). This could have influenced the study's prevalence. Furthermore, the study used HBsAg as a marker for Hepatitis B infection, which is unreliable when used alone. Other hepatitis B virus markers exist and, when combined with HBsAg, would be more reliable.

Furthermore, ELISA and PCR tests, which are more sensitive than rapid tests for hepatitis B disease, were not used, which may have resulted in an underestimation of the prevalence of hepatitis B disease. The study also only looked at the prevalence of HBsAg among women who had visited ANC at ARRH during the time of data collection.

This does not provide a generalization of the country's prevalence. Given the study's cross-sectional design, it is impossible to rule out any cause-effect relationship between the factors assessed and HBsAg positivity. Additionally, due to social desirability bias and recall bias from self-reported knowledge, this has limitations in and of itself because the information provided by participants cannot entirely be relied on.

Conclusions

The study participants were knowledgeable to a great extent about Hepatitis B disease, with 82.1% of the participants scoring greater than or equal to 6 out of the 12 questions to test knowledge of Hepatitis B disease. There are gaps in knowledge, especially among the low educated groups, which need to be addressed to improve knowledge levels in the community.

The results show a relatively healthy population given the low prevalence of 2.05% seen in the participants of the study. However, 86% of the positive cases of HBsAg in the study had a maximum education level of primary school. This creates a need for specific interventions to target populations with low levels of education to reduce the spread of hepatitis B disease.

The absence of a risk factor associated with hepatitis B disease in this study does not imply that there are no risk factors in the community around ARRH. However, further studies with larger sample sizes will be required to assess more potential risk fac-

tors associated with hepatitis B disease and the prevalence among women attending ANC at ARRH.

Competing Interests

The authors declare that they have no competing interests.

Ethical Clearance and Consent to Participate

Ethical approval for the study was sought, and approval from the Mount Kenya University Ethics and Review Committee (MKU/ERC/1351), TASO REC (TASOREC/074/19-UG-REC-009), Arua Regional Referral Hospital Ethics and Research Committee (ARRH/355/1) and the National Council of Science and Technology (HS785ES) was given prior to conducting the study. Participation in the study was voluntary and participants were assured that anyone who was not inclined to participate or decided to withdraw after giving consent would not be victimized. All information collected from this study was kept strictly confidential.

Funding Information

The funding of the study is solely by personal resources from Benjamin Atwine the principal investigator and a student at Mount Kenya University.

Availability of Data and Materials

The datasets used during and/or analyzed during the study are available from the corresponding author upon reasonable request.

Consent for publication

Not applicable

Author's Contributions

BA was responsible for the study design, literature search, and write-up; MAS and AOO were responsible for reviewing and giving technical input to the write-up and reviewed the final draft; BA and EM was responsible for data collection; BA was responsible for data analysis. All authors read and approved the final draft.

Acknowledgement

We are thankful to the management of the Mount Kenya University for their support in the field of medical training and research. We thank the various ethical and review boards that granted clearance for the study to be conducted. We are thankful to everyone who participated in this study.

References

1. World Health Organisation. (2017). Hepatitis B Fact Sheet No.204. Geneva, Switzerland: World Health Organization.
2. Schweitzer, A., Horn, J., Mikolajczyk, R. T., Krause, G., & Ott, J. J. (2015). Estimations of worldwide prevalence of chronic hepatitis B virus infection: a systematic review of data published between 1965 and 2013. The Lancet, 386(10003), 1546-1555.
3. Hwang, E. W., & Cheung, R. (2011). Global epidemiology of hepatitis B virus (HBV) infection. North American Journal of Medicine and Science, 4(1).
4. Kiire, C. F. (1996). The epidemiology and prophylaxis of hepatitis B in sub-Saharan Africa: a view from tropical and subtropical Africa. Gut, 38(Suppl 2), S5-12.
5. Kafeero, H. M., Ndagire, D., Ocama, P., Kudamba, A., Walusansa, A., & Sendagire, H. (2021). Prevalence and predictors of hepatitis B virus (HBV) infection in east Africa: evidence from a systematic review and meta-analysis of epidemiological studies published from 2005 to 2020. Archives of Public Health, 79(1), 1-19.
6. Atwine, B., Suleiman, M. A., Odongo, A. O., & Manenga, E. (2022). Knowledge and Risk Factors of Hepatitis B Disease Among Women Attending Antenatal Care at Arua Regional Referral Hospital, Arua, Uganda.
7. Ministry of Health, U. (2018). The progress of implementation of Hepatitis B vaccination program in Uganda. Kampala: Ministry of Health.
8. Teo E-K, & Lok, A. (2009). Epidemilogy ,transmision, and prevention of hepattitis B virus infection. Basow DS: Waltham,MA.
9. Parry, E., Godfrey, R., Mabey, D., & Gill, G. (2009). Hepatitis Viruses. Cambridge: Cambridge University Press,, 710-712.
10. Abdulai, M. A., Baiden, F., Adjei, G., & Owusu-Agyei, S. (2016). Low level of Hepatitis B knowledge and awareness among pregnant women in the Kintampo North Municipality: implications for effective disease control. Ghana medical journal, 50(3), 157-162.
11. Ngaira, J. A. M., Kimotho, J., Mirigi, I., Osman, S., Lwembe, R., & Ochwoto, M. (2016). Prevalence, awareness and risk factors associated with Hepatitis B infection among pregnant women attending the antenatal clinic at Mbagathi District Hospital in Nairobi, Kenya. The Pan African Medical Journal, 24.
12. Bond, L., & Nolan, T. (2011). Making sense of perceptions of risk of diseases and vaccinations: a qualitative study combining models of health beliefs, decision-making and risk perception. BMC public health, 11(1), 1-14.
13. Thio, C. L., Guo, N., Xie, C., Nelson, K. E., & Ehrhardt, S. (2015). Global elimination of mother-to-child transmission of hepatitis B: revisiting the current strategy. The Lancet Infectious Diseases, 15(8), 981-985.
14. Fattovich, G., Bortolotti, F., & Donato, F. (2008). Natural history of chronic hepatitis B: special emphasis on disease progression and prognostic factors. Journal of hepatology, 48(2), 335-352.
15. Vodkin, I., & Patton, H. (2014). Management of hepatitis B virus infection during pregnancy. Minerva Gastroenterol Dietol.
16. Gambarin-Gelwan, M. (2007). Hepatitis B in pregnancy. Clinics in liver disease, 11(4), 945-963.
17. Lai, C. L. (2003). Viral hepatitis B. Lancet, 362, 2089-2094.
18. McMahon, B. J. (2010). Natural history of chronic hepatitis B. Clinics in liver disease, 14(3), 381-396.
19. UN. (2021, August 24). Millennium Goals. Retrieved from child health
20. Frambo, A. A. B., Atashili, J., Fon, P. N., & Ndumbe, P. M.

(2014). Prevalence of HBsAg and knowledge about hepatitis B in pregnancy in the Buea Health District, Cameroon: a cross-sectional study. BMC research notes, 7(1), 1-7.
21. Han, Z., Yin, Y., Zhang, Y., Ehrhardt, S., Thio, C. L., Nelson, K. E., ... & Hou, H. (2017). Knowledge of and attitudes towards hepatitis B and its transmission from mother to child among pregnant women in Guangdong Province, China. PloS one, 12(6), e0178671.
22. Elfil, M., & Negida, A. (2017). Sampling methods in clinical research; an educational review. Emergency, 5(1).
23. World Health Organization, WHO. (1990). Expanded programme on immunization ,protocol for assessing prevalence of hepatitis B in Antenatal patients. Geneva, Switizerland: WHO.
24. UBOS, U. B. (2020). Statistical Abstract. Kampala: Uganda Bureau of Statistis.
25. Peltzer, K., & Ajegbomogun, B. (2005). Utilisation of antenatal care in a Nigerian teaching hospital. African journal of reproductive health, 159-161.
26. Rabiu, K. A., Akinola, O. I., Adewunmi, A. A., Omololu, O. M., & Ojo, T. O. (2010). Risk factors for hepatitis B virus infection among pregnant women in Lagos, Nigeria. Acta obstetricia et gynecologica Scandinavica, 89(8), 1024-1028.
27. Cisneros-Castolo, M. A. R. T. I. N., Ibarra-Robles, I. E., & Escobedo-De La PeÃ±a, J. (2001). Prevalence of hepatitis B virus infection and related risk factors in a rural community of Mexico. The American journal of tropical medicine and hygiene, 65(6), 759-763.